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Brome Grass Seed Production in Western Canada

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BROME GRASS SEED PRODUCTION IN WESTERN CANADA

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The production of brome grass seed in Canada has expanded greatly since 1940. For the period 1934 to 1940 the average annual production was 2,420,000 pounds while for the period 1941 to 1949 the average annual production was 8,876,488 pounds[4]. For 1950 a record production of 13,932,000 pounds has been estimated from an area of 89,400 acres. Production has been confined almost entirely to the Prairie Provinces. For the period 1947 to 1950 the average annual productions of Alberta, Saskatchewan and Manitoba were respectively 4,050,000 pounds, 3,150,000 pounds, and 1,637,500 pounds. The great bulk of Canadian seed has been exported with practically all seed going to the United States. Exports for 1947, 1948, and 1949 represented 60, 86, and 91 per cent respectively of Canadian production.

Areas Suited To Brome Grass Seed Production

Brome grass is well adapted as a forage crop to the dark brown soils and park areas of the Prairie Provinces. Seed production, however, tends to be localized in certain districts within the general adaptation area. Figure 1 shows the distribution of growers of certified seed for the Prairie Provinces in 1950.

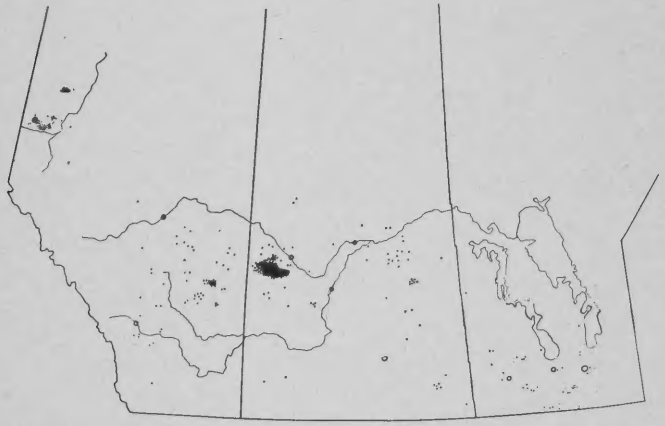

Figure 1—Distribution of certified seed production in the Prairie Provinces in 1950. Each dot represents 100 acres.

As the total area in certified seed production for the three provinces in 1950 was 42,000 acres or slightly less than half of the total area harvested for seed, the distribution indicated in Figure 1 may not be completely representative. In Saskatchewan, seed production is concentrated in the Unity—Cutknife—Wilkie area within the dark brown soil zone. Within this area

1 Dominion Forage Crops Laboratory, Saskatoon, Sask.
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brome grass is grown for seed on soils of all textures but particularly on light loams, sandy loams, and sands. Seed production has not been extensive on heavy soils since stands on such soils tend to become unproductive after the first seed crop. Fields will remain productive of seed on lighter soils for six years or longer. In Alberta production is more widespread although concentrations are noticeable in the east central districts within the brown and dark brown soil zones and on transition and grey wooded soils of the Peace River area. Seed production in central Alberta is mainly on lighter soils. This widespread distribution points to the possibility of producing brome grass seed rather generally throughout the dark brown, black and transition soils of the Prairie Provinces with the enterprise being most profitable on lighter soils less suited to the production of cereal crops.

Stand Establishment

Varieties.—Brome grass seed produced in Western Canada is of the northern type, usually with no varietal designation. Southern varieties of brome grass developed in the United States are hardy in Canada and are equal to the northern type in hay production. Seed yield of southern varieties is about half that of the northern type and for this reason they are not recommended. Superior and Parkland are two licensed varieties of the northern type which have restricted use. The Superior strain is similar to the northern commercial type in seed and forage production but is slightly less strongly creeping. Parkland is more restricted in its creeping habit than is Superior. The Parkland variety generally yields one-third less seed than the commercial type and for this reason the variety is not extensively grown.

Choice of Seed.—It is imperative that couch-free seed be used in establishing fields for seed production. Certified couch-free seed should be used as such seed has been produced in fields which have been inspected prior to harvest and found to be free from couch grass. In addition, certified seed has been laboratory inspected for freedom from couch grass. Commercial No. 1 seed represents seed which has been found to be free from couch grass on laboratory inspection only. Lower grades of commercial seed almost always contain couch grass and should not be used. Seed which has been kept on hand for over three years will have lowered germination and should not be used without a germination test.

Use of a Nurse Crop.—Generally brome grass is sown in the spring with a nurse crop of wheat or oats. This plan usually results in a light crop of brome grass the second year with full production of seed being obtained in the third year. Profitable crops of seed may be obtained the year after seeding if no nurse crop is used and if weeds are controlled by mowing or by the use of 2,4-D. If the nurse crop is seeded at half the regular rate or cut during July for green feed, the grass will generally give a better yield of seed the year following seeding. Figure 2 indicates the marked decrease in plant vigour of brome grass which results from the use of a nurse crop of wheat sown at the regular rate and harvested for grain.

When to Seed.—Early spring seeding is recommended as a rule in the Prairie Provinces. Seeding around September 1 or in late October also will give satisfactory stands. Early September seedings are recommended only when moisture conditions are favourable. Fall seedings will not result in seed crops the next year as plants are not fully established. In park areas the time of planting is less important but seeding should be done before July otherwise plants do not have time to establish themselves before the onset of winter. Seedings made in the fall should be made on clean stubble while those made in the spring should be on fallow or well prepared stubble land.

Figure 2—Effect of method of seeding and subsequent treatments on the vigour of brome grass plants. Stands sown May, 1950, and single plants photographed October, 1950.

Methods of Seeding.—Practically all brome grass seed is produced from solid seedings. The establishment of stands, control of weeds, and harvesting operations are more easily carried out when the crop is grown in solid stands than when grown in rows. There is evidence, however, that when grown in rows, one to three feet apart, stands will remain in production for a longer period of time. It is recommended that seedings in rows 12 inches apart be tried instead of 6 inches apart if the grass is to be used primarily for seed production.

Throughout the seed area brome grass is seldom grown with alfalfa for seed. Limited studies at the Dominion Forage Crops Laboratory, Saskatoon, Sask., and the Dominion Experimental Station, Melfort, Sask., indicate that the association of alfalfa with brome grass has not increased or decreased the seed yields of the grass. However, the mixture is undesirable from a seed cleaning standpoint. Fields with a heavy growth of alfalfa will not be considered for certification as broken pieces of alfalfa stems present a difficult seed cleaning problem. It is often impossible to obtain a certified grade because of the amount of inert matter present. If the mixture is straight combined green portions of the alfalfa plant will thresh out with the brome grass seed and cause heating.

Whether sown alone or with a nurse crop, it is essential that the depth of seeding should not exceed one inch. Seeding into a firm seed-bed helps to ensure shallow seedings. When seeding without a nurse crop, some difficulty will be experienced in keeping the seed flowing freely through the drill. The

drill box should be only partially filled with seed and extra help should be on hand to see that the drills keep running. An equal volume of cereal grain added to the grass will help in getting more uniform seeding and yet give little competition for the grass. If a nurse crop is used in the regular manner the grass and cereal seed may be mixed and sown together or they may be drilled separately.

Rate of Seeding.—Slightly lower rates of seeding should be used when the crop is grown for seed than when grown for hay or pasture. A rate of 6 to 8 pounds per acre is recommended for seed production. Lighter rates of seeding will result in less dense stands and this in turn will delay the time taken for the crop to become sodbound and thus unproductive of seed. Table 1 gives suggested drill settings for seeding brome grass in 6-inch drills. If rows 12 inches apart are wanted, drill settings roughly twice those given for 6-inch spacings should be used.

TABLE 1—SUGGESTED DRILL SETTINGS FOR SEEDING BROME GRASS AT 8 POUNDS PER ACRE IN 6-INCH DRILL SPACINGS

Method of Seeding	New forced feed	Old fluted feed
Brome alone	35 lb. wheat scale	6 pk. wheat scale.
Brome with an equal volume of oats	———	5 pk. oats scale.
Brome with wheat seeded 1 bu./acre	———	7 pk. wheat scale.

Seeding rates in Table 1 are approximate settings only and should be checked under operating conditions using measured quantities of seed over a given acreage. Seeding brome with an equal volume of oats is intended to facilitate seeding the grass without giving a significant crop of oats.

Treatment of New Stands.—Grazing and strong competition from weeds in the year of seeding will cause reduced seed yields for one or more years. Weeds may be controlled by mowing once or twice or by the use of 2,4-D. Excellent control of weeds in grass seedings has been obtained by using 2,4-D at the same or slightly higher rates than those employed for cereal crops. Spraying or dusting should be delayed until seedlings have reached a height of 4 inches. Information is lacking on the effects on seed yields of spraying stands the year the seed is harvested. Until more information is available it is recommended that spraying be done before the middle of May and then at rates no heavier than those recommended for cereal crops.

Certified Seed Production

The continued acceptance of Canadian brome grass seed in the United States can best be assured by the maintenance of a high quality product. Couch grass is prevalent in all seed districts and rigorous field and seed inspection is necessary to control this weed. If seed fields are free from couch grass inspection may be requested and the seed marketed as Certified Couch Free[1]. The farm price of certified couch-free brome grass seed has generally been about one cent higher per pound than that of Commercial No. 1 seed and two to three cents above Commercial No. 2. Field inspection costs are a minimum of two dollars with an additional charge of 10 cents per acre for each additional acre over 20 acres. Inspection should be requested on forms pro-

[1] Plant Products Division, Production Service offices are located as follows for the Prairie Provinces: Dominion Public Building, Winnipeg, Man.; Federal Building, Saskatoon, Sask.; Immigration Building, Calgary, Alberta.

vided by the Plant Products Division, Canada Department of Agriculture. Applications should be in the hands of district inspectors before July 1. Certification may be granted on fields with small patches of couch grass provided all couch grass is mowed before the time of inspection. Prior to inspection large fields suspected of having couch grass should be separated with a mower swath into smaller portions. If patches of couch grass then are found there is less chance of the whole field being condemned.

Methods of Harvesting

Choice of Harvesting Machine.—The choice of harvesting method is determined by the equipment available on the farm, the nature of the seed crop, and the use intended for the straw. Light crops, or those which have matured uniformly, are generally straight combined. Swathing or cutting with a binder is more desirable when there is uneven maturity or much green leaf growth. Feed of good quality may be obtained in addition to a seed crop. For certain growers with livestock the use of the straw or mowed stubble may be a primary consideration. Following straight combining, fields intended for hay should be mowed as soon as possible as the quality of the hay deteriorates rapidly following combining. Combines picking up from the swath may be equipped with straw bunching attachments as shown in Figure 3.

Figure 3—Combine with bunching attachment to collect straw after picking up from the swath.

When to Harvest.—Fields are usually ready to cut with a binder or swather in late July and ready for straight combining about 10 days later. As the crop ripens the seed heads or panicles take on a brownish appearance and the upper parts of the seed stalks turn brown. Binding or swathing should be done when panicles are fully brown and the upper four or six inches of the seed stems are also brown. There may be some slight shattering at this time although the crop does not shatter easily. The crop is ready for straight combining when the seeds are easily stripped from the stems with the hand. The seed at this time also should shatter off readily if panicles are struck sharply across the palm of the hand.

Combine and Threshing Machine Settings.—Brome grass is more easily threshed than grain crops but the separation of seed and straw is more difficult. The quality of the seed, tailings, and straw should be checked regularly as they are guides to the proper setting of machines. Regardless of settings used, the combine or threshing machine should be checked regularly for stoppages or clogging of the return, sieves, and straw decks.

Cylinder speed is generally reduced 100-200 R.P.M. from that used for wheat. Too great a reduction in cylinder speed is likely to result in clogging of the straw decks. Concaves should be adjusted to remove all seed from the straw and yet not cause shelling or peeling of seeds or excessive breakage of the straw. Short pieces of straw are difficult to remove from brome grass seed as they are about the same weight and shape as the seed. In spike tooth cylinders all concave teeth may be removed and replaced with blanks. For rub bar cylinders concaves should be closed slightly from the settings used in threshing wheat. The threshed seed should be examined to see that spikelets are threshed out as single seeds. Seed cleaning plants generally do not re-thresh seed and seeds attached to one another after threshing will be taken out as dockage.

Wind setting is very important and the air blast should be reduced or cut off entirely. The tailings should be inspected to see that no filled seeds are blown over. Seed cleaning plants regularly expect from 10 to 20 per cent of inert matter in the seed as it comes from the grower. Overly clean seed is an indication that some of the lighter seeds are being lost. Adjustable sieves should be opened considerably from the settings used for wheat. Some difficulty may be experienced with straw clogging the round-hole sieves at the rear of the adjustable sieve. This may be overcome by the substitution of short extension adjustable sieves or blank pieces of tin or galvanized iron in place of the round-hole sieve.

Threshing machines should be fed evenly and at about half the rate used for wheat. This will allow more complete separation of straw and chaff. Sheaves should be fed straight as this will result in less breakage of straw.

Handling of Seed.—All seed is handled commercially in 100-pound bags. These are supplied by seed companies contracting for the seed. Where crops are heavy bagging is frequently done on the combine with special platforms built to hold bags and operator (Figure 4). There is serious danger of seed heating when combined directly or picked up from the swath. If the seed is tough or contains much green material or weeds it should be spread out thinly on a clean floor and allowed to dry. Heating dangers may be reduced by filling bags without packing and allowing them to stand upright in groups of two or three within the seed field. Little cleaning of seed is done on farms. Seed companies have excellent facilities for seed cleaning, seed storage, and subsequent marketing.

Management of Fields

After fields are harvested for seed they may be pastured briefly. Grazing should be discontinued in time to permit ample new growth to develop before freeze-up. Fields intended for seed should not be grazed in the spring under any circumstances. Heavy stubble and weed growth may be burned off in the spring or fall. There is no experimental evidence in support of burning although occasional growers consider that burning stimulates seed production.

Highest seed yields usually are obtained the first two years after the stand has become established. Thereafter seed yields decline until the fifth or sixth year when stands are quite unproductive of seed and also rather low in production of hay. Various practices have been developed to restore seed yields. Thinning the stand by means of shallow tillage is the most common method. The use of commercial fertilizers also has been found to increase seed yields under good moisture conditions.

Figure 4—Combining brome—Note special platform for bagging the seed.

Rejuvenation by Tillage.—The rejuvenation of stands by ploughing or one-waying has become a standard practice with many growers. Yields of seed following such rejuvenation frequently exceed those obtained from the original seeding. Some growers have adopted a four-year cycle of growing brome grass seed. For three years a seed crop is removed and then the stand is ploughed and a cereal crop taken off in the fourth year. The grass volunteers sufficiently to form a stand to be used for seed production again. The response in seed yields from various rejuvenation methods has been investigated at the Dominion Experimental Station, Scott, Sask., with the results shown in Table 2.

TABLE 2—THE EFFECT OF REJUVENATION TREATMENTS ON SEED YIELDS OF BROME GRASS. DOMINION EXPERIMENTAL STATION, SCOTT, SASK., 1948-1950. ALL TREATMENTS APPLIED IN THE EARLY SPRING OF 1948.

Treatment	Seed yield in pounds per acre			
	1948	1949	1950	1948-1950 Average
Check	34	98	24	52
Manure—10 tons per acre	30	121	35	62
Manure—10 tons per acre with shallow one-way disking	39	149	81	90
Shallow one-way disking	42	130	57	76
Ploughing 4 inches deep	14	167	190	124
Least significant difference (P=·05)		48	34	

From the data given in Table 2 it is apparent that ploughing 4 inches deep was the most satisfactory method of rejuvenation given. Seed yields after ploughing were higher for the three-year period than after one-way disking or manure applications. Within the brome grass seed areas ploughing is done both in the late fall and very early spring. Ploughing should be shallow, otherwise serious killing may result. From field observations of a number of farms, it would appear that the new heavy-duty cultivators, equipped with chisel teeth also may present a promising means of rejuvenating old brome stands. The details, such as the time and number of operations, as well as the depth of tillage for maximum efficiency, have not been determined as yet. Oats is the cereal crop usually used for seeding on rejuvenated brome grass fields. It is important that oats seeded on brome seed fields be free from wild oats otherwise wild oats may volunteer sufficiently to cause a separation problem in the brome grass seed in subsequent years.

Figure 5—Periodic shallow ploughing of brome grass sod in early spring or late fall is the best way of improving seed yields in dry areas.

Commercial Fertilizers.—Barnyard manure may be used to overcome the sodbound condition with good results. However, where large areas are to be rejuvenated the use of commercial fertilizers becomes of interest. Experiments carried out from 1947 to 1950 indicate that high-nitrogen fertilizers will give seed increases of from 50 to 150 pounds per acre provided moisture conditions are favourable. In dry seasons the increases in seed yields from the use of fertilizers have been negligible. The results from six tests in the Unity-Wilkie seed area in 1950 are given in Table 3. The results of a single test conducted by the Dominion Experimental Station, Melfort, Sask., in 1950 are given in Table 4. Moisture conditions for the first area were fair to good, while for the second area moisture conditions were very good. Fertilizers used in these trials were ammonium nitrate (33.5% nitrogen) and ammonium sulphate (21% nitrogen). Rates of application for ammonium nitrate were roughly two-thirds those for ammonium sulphate in order to allow a comparison of fertilizers on the basis of equal applications of nitrogen.

TABLE 3—EFFECT OF NITROGEN FERTILIZERS ON SEED AND FORAGE YIELDS OF BROME GRASS. BASIS SIX FARMS IN THE UNITY-WILKIE AREA, 1950

Fertilizer	Method of application		Yield—lb. per acre	
	Time	Rate lb. per acre	Seed	Forage
Ammonium sulphate	Fall	100	115	2224
Ammonium sulphate	Fall	200	145	2807
Ammonium sulphate	Fall	400	147	3943
Ammonium sulphate	Spring	200	107	2628
Ammonium nitrate	Spring	125	92	3112
Check-no treatment	Spring		92	1600
Least significant difference (P=·05)			31	322

TABLE 4—EFFECT OF NITROGEN FERTILIZERS ON SEED AND FORAGE YIELDS OF BROME GRASS. MELFORT, SASK., 1950

Fertilizer	Method of application		Yield—lb. per acre	
	Time	Rate lb. per acre	Seed	Forage
Ammonium sulphate	Spring	100	123	1660
Ammonium sulphate	Spring	200	162	2099
Ammonium sulphate	Spring	400	192	3015
Ammonium sulphate	Spring	800	249	3497
Ammonium nitrate	Spring	62	138	1895
Ammonium nitrate	Spring	125	190	2381
Ammonium nitrate	Spring	250	224	3942
Ammonium nitrate	Spring	500	280	4523
Check-no treatment			81	1132
Least significant difference (P=·05)			37	760

The results shown in Tables 3 and 4 indicate that large increases in seed yields may be obtained from the use of nitrogen fertilizers provided moisture conditions are favourable. Greater increases in seed yields noted for the Melfort test than for the Unity-Wilkie tests from the use of fertilizers may be attributed to the better moisture conditions in the former area, particularly in the early spring. On the basis of the Unity-Wilkie tests fall application seems preferable to spring application so far as seed yields are concerned. The results from the Melfort test indicate that when applied in the spring ammonium nitrate is preferable to ammonium sulphate. The yields of hay were greatly increased in all tests following fall or spring applications of fertilizer.

On the basis of these preliminary tests it is recommended that if fertilizers are used, they should be applied at rates of at least 125 pounds per acre for ammonium nitrate or 200 pounds per acre for ammonium sulphate. At present prices of fertilizer these rates of application represent a cash outlay per acre of approximately $5.00 for ammonium nitrate fertilizer and $6.00 for ammonium sulphate fertilizer. If seed alone is harvested the price of seed is an important factor in determining whether the use of fertilizers is practical. If there is additional use for the hay then the use of fertilizers can be recommended more generally. It would be advisable to fertilize small acreages at first, preferably the lower portions of the fields where more moisture is available. Preliminary observations indicate that fall applications before October 1 may be more desirable than late fall applications or spring applications. Fertilizers may be broadcast on the surface using a fertilizer spreader, endgate seeder, bait spreader, or grain drill.

Snow Ploughing.—Brome grass, like other perennial forage crops, responds markedly to additional moisture in the early spring. Unfortunately, in most of the brome seed producing areas, this is usually a period of low rainfall. Therefore, trials were initiated at the Experimental Station, Scott, Sask., to determine the feasibility of augmenting the scant spring moisture supply by

artificially accumulating snow on established brome stands. The snow was accumulated by means of throwing up ridges of snow with a V-shaped snow plough[1]. The space between the ridges was eight feet in width. Ridging was begun as soon as sufficient snow had fallen; a uniform snow cover at least four inches in depth was required before ridging could be started. After the space between the ridges had been filled with snow, the operation was repeated, thus increasing the height of the ridges and the depth of snow accumulated. With the available equipment it was possible to artificially accumulate snow, by successive ridging with the snow plough, to a depth of 36 to 40 inches. On the plots which were not ridged the depth of snow seldom exceeded the height of the previous seasons brome stubble, i.e. some four to five inches. The additional moisture available to the grass from the artificially accumulated snow has in many seasons been considerable, as shown by the seed yields for the years 1948 to 1950 given in Table 5.

TABLE 5—THE EFFECT OF SNOW PLOUGHING ON SEED YIELDS OF BROME GRASS. DOMINION EXPERIMENTAL STATION, SCOTT, SASK., 1948-1950

Treatment	Average annual yield of seed in pounds per acre		
	Snow Ploughed	Not Snow Ploughed	Difference
Check	72	52	+20
Manure—10 tons per acre	89	62	+27
Manure—10 tons per acre with shallow one-way disking ..	156	90	+66
Shallow one-way disking	125	76	+49
Ploughing 4" deep	192	124	+68

Average yields include 1948 when yields of seed were low for certain rejuvenation treatments. For 1949 and 1950 marked increases in seed yields were obtained ranging from 79 to 145 pounds per acre for the one-way disked and ploughed areas. It would appear that snow ploughing is a very desirable method of increasing seed yield of brome grass, especially when used in conjunction with tillage treatments.

Eradication of Brome Grass.—Brome grass can best be eradicated by ploughing during July after a hay crop has been removed. Ploughing should be done deeply and the sods worked down thoroughly with heavy disking or packing. Under favourable moisture conditions there will be some regrowth which will require continued cultivation for the remainder of the season. Ploughing may be done in the spring or fall but there is more likelihood of regrowth at these seasons.

Brome grass has been found to cause reduced yields of cereal crops which follow. This results from the low availability of moisture and nitrogen in old brome grass fields. It is advisable that at least a partial fallow period precede the seeding of the cereal crop after the brome grass is broken up. The use of fertilizers has not been sufficiently investigated on brome grass sod for recommendations to be made. It is suggested for the present that fertilizers with high nitrogen analysis such as ammonium phosphate (16-20), ammonium nitrate, or ammonium sulphate be applied at high rates of 75 to 100 pounds per acre.

Wireworms may increase when brome grass is grown for four or more years and may cause considerable damage to subsequent cereal crops. Wireworms may be effectively controlled by the use of Lindane (gamma BHC) seed

[1] More detailed information on snow ridging, particularly with regard to techniques and methods may be found in Publication 696, Snow Utilization in Prairie Agriculture by G. D. Matthews, Dominion Experimental Station, Scott, Sask., published in 1940.

dressings, at one ounce of active material per acre, applied to the seed of the first cereal crop, especially wheat, sown on rebroken brome sod. The present cost of this treatment is approximately one dollar per acre. If brome grass or other grasses are seeded on brome sod, damage to these crops from wireworms may also be anticipated. Lindane should not be applied to forage crop seeds as germination is adversely affected by the chemical. In such cases the treatment should be made to seed of the nurse crop if one is used or to a cereal crop seeded the year before the forage crop.

Hazards of Production

While brome grass is easily harvested and will give profitable returns to growers when seed prices are high, production should not be undertaken without regard to the hazards involved. Prospective growers should first of all be prepared for occasional seeding failures, particularly in open prairie districts. Forage crops are more sensitive than cereal crops to damage from drought, soil drifting, and insect pests such as cutworms, wireworms, and grasshoppers. If a nurse crop is used in seeding the grass may be so weakened in the first year of growth that full production of seed is not obtained until the third or fourth year.

Returns to growers have fluctuated greatly as a result of the extreme variability in yields and prices of seed. The average yield of seed on the basis of total Canadian acreage and production for the years 1947 to 1950 has been 112 pounds per acre. For new stands in years with good moisture conditions yields of 400 pounds per acre may be obtained. Brome grass fields usually have low reserves of moisture and are very dependent on rains during May and June when active vegetative growth is taking place. Drought periods in May and June are common over the open prairie areas with disastrous effects on subsequent seed production.

Late spring frosts will severely reduce seed production as the crop is susceptible to frost injury. Early June frosts may cause little apparent damage to leaf growth and yet result in white, sterile seed panicles when heading occurs. Grasshoppers may cause damage from early spring until harvest. Where infestations are severe they should be controlled by spraying or baiting. Brome grass also is easily damaged by hail although the crop is insurable in this regard.

Over the past 15 years the farm price of brome grass seed has varied from five to forty cents per pound in Western Canada with an average price of approximately eight cents per pound. Since much of the Canadian seed produced is marketed in the United States, prices in Canada have been very dependent on production, price supports, and import restrictoins of the United States. Production in Canada has been favoured in recent years because of the failure of the United States to produce enough seed for the expanding use of this crop. Some curtailment of imports from Canada may be expected as a result of increased seed production in the United States and the recommendation of varieties more adapted to southern conditions than the northern type of brome grass produced in Canada.

The production of brome grass seed will likely be most successful where other benefits arise from growing the crop, such as the production of feed for stock or the control of soil drifting. While brome straw is not so high in quality as hay cut at the proper stage nevertheless it is a satisfactory feed and will winter cattle well. When growing seed there is also the opportunity of grazing fields for a short period after the seed crop is harvested. In years of severe drought seed crops also may be sacrificed to provide reserves of pasture or hay.

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